

### REMARKS

The Office action of October 6, 2008, has been carefully considered.

The specification has been amended to utilize proper subject matter headings, and to add a section of "Brief Description of the Drawings."

The claims have been amended to use proper Markush Group language (claims 2 and 10) and to provide a basis for reciting the time period of treatment (claim 5).

Claims 1 and 12 have been rejected under 35 USC 102(b) as anticipated by the Derwent Abstract of CN 1144102(A), and Claims 2-11 have been rejected under 35 USC 103(a) over the Derwent Abstract in view of Lane et al.

The Office action correctly points out that the invention is directed to a method for extracting organic substances from coral comprising treating the coral with a fluid or fluid mixture in a supercritical state without modifying the crystalline structure of the coral, and at a temperature less than 270°C.

The Office action then alleges that the Derwent Abstract teaches the same, "wherein an organic substance present in coral is subjected to extracting procedures using supercritical carbon dioxide, at a temperature less than 270 degrees C and at a given optimum pressure which can be higher than the critical pressure of the fluid."

In fact, the Derwent Abstract does not teach the same. To the contrary, the Derwent Abstract teaches the preparation of a material known as "coral ginger oil" by pulverizing dried coral ginger, then extracting the coral ginger granules using supercritical carbon dioxide at a given temperature and pressure.

According to the invention, the material known as "coral" which is extracted is described as having a porous structure,

essentially (about 97%) composed of mineral material, mainly calcium carbonate with the remainder (about 3%) being constituted by oxides and magnesium and iron together with organic substances which are responsible for its color. The source of this "coral" is well known to be a marine animal.

Submitted herewith labeled **Exhibit 1** is a full copy of CN 1144102(A), with abstract obtained from Espacenet. While the bulk of this reference is in Chinese, on page 1 of the specification, one can find the Roman characters "*Zingiber Corallinum Hance*," with the words "zingiber corallinum" being in Latin which translates into English as "coral-colored ginger." *Zingiber corallinum*, or coral ginger in the abstract, is a Chinese plant which is unrelated to the marine animal coral. Submitted herewith labeled **Exhibit 2** is a description and an illustration of this plant, taken from the website "efloras.org." Also attached, labeled **Exhibit 3**, is a page from a website offering this plant for sale.

If there is any question as to whether the reference CN 1144102(A) discloses the extraction of coral according to the invention, it is strongly suggested that the Examiner obtain a full translation of this reference, which will establish that the reference is unrelated to the claimed invention.

As to the Lane et al reference, the discussion of prior art in the reference notes that calcium crystals from coral can serve as a matrix or support for bone growth. The invention of this reference, however, is directed to fractionation of **omental** extracts obtained from adult female cats. While the extraction methods may include supercritical gas extraction with carbon dioxide, there is absolutely nothing in this reference which discloses or suggests using supercritical carbon dioxide to extract organic matter from coral to obtain a material suitable for bone growth. Moreover, while Lane et al

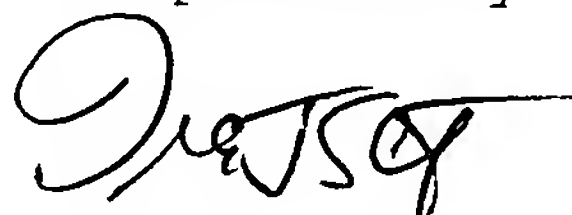
teaches supercritical extraction with carbon dioxide, the use of ethanol, acetone and other materials is thought to be solely in conjunction with conventional extraction methods.

Thus, the cited references taken individually or in combination do not disclose or suggest supercritical extraction of (marine) coral to remove organic material and thereby obtain a mineral material suitable to promote bone growth.

Withdrawal of these rejections is requested.

In view of the foregoing amendments and remarks, Applicants submit that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,



Ira J. Schultz  
Registration No. 28666  
Attorney for Applicants  
(703)837-9600, ext. 23

EXHIBIT 1

**Method for extracting coral ginger oil by using supercritical CO2**

**Publication number:** CN1144102 (A)

**Publication date:** 1997-03-05

**Inventor(s):** GUCUN WAN [CN]; HUA LIU [CN]; YI LIU [CN]

**Applicant(s):** GUIZHOU PROV BIOLOG RESOURCE S [CN]

**Classification:**

- **International:** (IPC1-7): A61K35/78

- **European:**

**Application number:** CN19951008792 19950830

**Priority number(s):** CN19951008792 19950830

**Abstract of CN 1144102 (A)**

The preparation method of coral ginger oil is as follows: the dried coral ginger is pulverized to a certain grain size, then the broken coral ginger granules are extracted under the conditions of 7MPa-32MPa of pressure and 25-65 deg.C of temp. in the extracting tank by using supercritical CO2, then are separated under the conditions of 3MPa-6MPa of pressure and 0-55 deg.C of temp. in the separating tank so as to obtain the invented coral ginger oil. Said invented method is rapid in extracting speed, high in extracting efficiency, good in its finished oil quality, and can completely retain its medicinal activity.

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[19]中华人民共和国专利局

[51]Int.Cl<sup>6</sup>

A61K 35/78



# [12] 发明专利申请公开说明书

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[43]公开日 1997 年 3 月 5 日

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[22]申请日 95.8.30

[71]申请人 贵州省生物资源超临界流体萃取研究开发中心

地址 550002贵州省贵阳市观水路73号

[72]发明人 万固存 刘 华 刘 毅 肖 尧

权利要求书 1 页 说明书 3 页 附图页数 1 页

[54]发明名称 用超临界CO<sub>2</sub>提取珊瑚姜油的方法

[57]摘要

用超临界 CO<sub>2</sub> 提取珊瑚姜油的方法, 涉及从植物中萃取油脂的方法, 目的在于提供用超临界 CO<sub>2</sub> 从珊瑚姜中提取油的方法。本发明的方法是先将珊瑚姜通过干燥, 粉碎至一定粒度; 然后将珊瑚姜碎粒用超临界 CO<sub>2</sub> 在萃取罐中在压力 7MPa~32MPa、温度 25~65℃ 下进行萃取; 接着在分离罐中在压力 3MPa~6MPa、温度 0~55℃ 下分离。本方法的提取速度快、提取率高, 珊瑚姜油质量好, 完整地保留了药物的活性, 是一种清洁的化工技术。

## 权 利 要 求 书

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1 用超临界CO<sub>2</sub>提取珊瑚姜油的方法，其特征包括：

(1) 先将珊瑚姜通过干燥、粉碎至一定粒度；

(2) 将珊瑚姜碎粒用超临界CO<sub>2</sub>在萃取罐中进行萃取，萃取罐内控制的压力范围为7MPa~32MPa，温度范围为25~65℃。

(3) 接着在分离罐中进行减压分离，分离罐内控制的压力范围为3MPa~6MPa，温度范围为0~55℃。

2 按照权利要求1所述的方法，其特征在于珊瑚姜的干燥可以用温度不太高的热风烘干，也可以晒干，之后用粉碎机粉碎至粒径小于8mm。

3 按照权利要求1所述的方法，其特征在于每一轮萃取、分离需要1~3小时。

# 说 明 书

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## 用超临界CO<sub>2</sub>提取珊瑚姜油的方法

本发明涉及从植物中萃取油脂的方法，具体来说，涉及用超临界CO<sub>2</sub>从珊瑚姜中提取油的方法。

珊瑚姜(*Zingiber Corallinum Hance*), 俗名阴姜，系姜科植物，其根茎可入药，有消肿解毒作用，民间用来治疗感冒、肺寒咳嗽和腹痛腹泻；其精油添加到保健品和化妆品中去，可防治诸如癣类皮肤疾患。中国专利申请95103907.5已经记载了珊瑚姜的某些应用方法。从珊瑚姜中提取挥发油的方法有物理方法和化学方法，物理方法常用压榨、蒸煮、蒸馏和水蒸气提取等；化学方法通常用有机溶剂萃取，常用的有机溶剂是乙醇，也可以用石油醚、乙醚、醋酸乙酯等。物理方法得到的油品往往含有许多杂质成分，还容易变质，提取率也不高；化学方法萃取得到的油品往往含有萃取剂的残留物，影响其纯度，也影响其应用。超临界流体萃取是最近十多年来一项新兴的化工分离技术，处于临界状态的流体对溶质具有独特的溶剂优点：它不仅对溶质具有极高的溶解能力，而且通过改变温度或压力就可容易地改变对溶质的溶解度。人们经研究发现，CO<sub>2</sub>的临界点低，容易达到，同时，超临界CO<sub>2</sub>流体具有粘度低、介电常数高、扩散系数大、对溶质具有很高的溶解度等特点。近年来，超临界CO<sub>2</sub>萃取技术的研究不断发展。然而，迄今为止尚未有关于将此技术用于提取珊瑚姜油的公开报导；实践中，也还没有用超临界CO<sub>2</sub>提取珊瑚姜油的方法问世。

本发明的目的在于提供用超临界CO<sub>2</sub>从珊瑚姜中提取油的方法。



为达此发明目的，发明人经过反复的研究与实践，提供的方法包括：(1)先将珊瑚姜通过干燥、粉碎至一定粒度；(2)将珊瑚姜碎粒用超临界CO<sub>2</sub>在萃取罐中进行萃取；(3)接着在分离罐中进行减压分离。

珊瑚姜的干燥可以用温度不太高的热风烘干，也可以晒干，之后用粉碎机粉碎至粒径小于8mm。

超临界CO<sub>2</sub>的萃取装置包含将CO<sub>2</sub>加工至超临界状态的冷柜、计量泵、预热器及电控柜等设备，还包含用超临界CO<sub>2</sub>对天然物质进行提取的萃取罐、分离罐，另外，还有将减压后的CO<sub>2</sub>回收的管路系统。用超临界CO<sub>2</sub>提取珊瑚姜精油时，萃取罐内控制的压力范围为7MPa~32MPa，温度范围为25~65℃。分离罐内控制的压力范围为3MPa~6MPa，温度范围为0~55℃。

每一轮萃取、分离需要1~3小时。

使用超临界CO<sub>2</sub>提取的珊瑚姜油没有任何有机溶剂的残留，萃取出的油品应用时不会对人体造成伤害；萃取温度比传统的化学溶剂法及水蒸汽法低，这样可以避免破坏珊瑚姜油中萜类有效成分的结构，完整地保留了药物的活性；本方法的提取速度快、提取率高，传统方法只能提取出珊瑚姜药效成分的40%~60%，而且提取时间需要6~12小时；而本方法仅需1~3小时，就可以提取出珊瑚姜药效成分的90%以上。此外，本方法基本无“三废”排放，对环境无污染，是一种清洁的化工技术。

附图为用超临界CO<sub>2</sub>萃取珊瑚姜油的工艺流程示意图，其中，1为CO<sub>2</sub>气瓶，2为冷柜，3为CO<sub>2</sub>储罐，4为泵，5为预热器，6为萃取罐，7为流量计，8为分离罐；P、T分别为压力表和温度计。



实施例：称取10kg预先干燥的珊瑚姜干姜，用破碎机破碎至粒度1mm以下，装入萃取罐(6)，关闭罐子，通入从气瓶(1)经冷柜(2)、泵(4)来的超临界CO<sub>2</sub>，在10MPa、32℃下进行萃取；萃取液进入分离罐(8)，在3MPa、25℃下进行分离。在上述条件下萃取2小时，得到浅黄色油608g。提取率为6.08%。从分离罐(8)分离出来的CO<sub>2</sub>回到冷柜(2)。提取结束，停泵(4)、放掉CO<sub>2</sub>，开启萃取罐(6)取出残渣，进行第二轮操作。

# 说明书附图

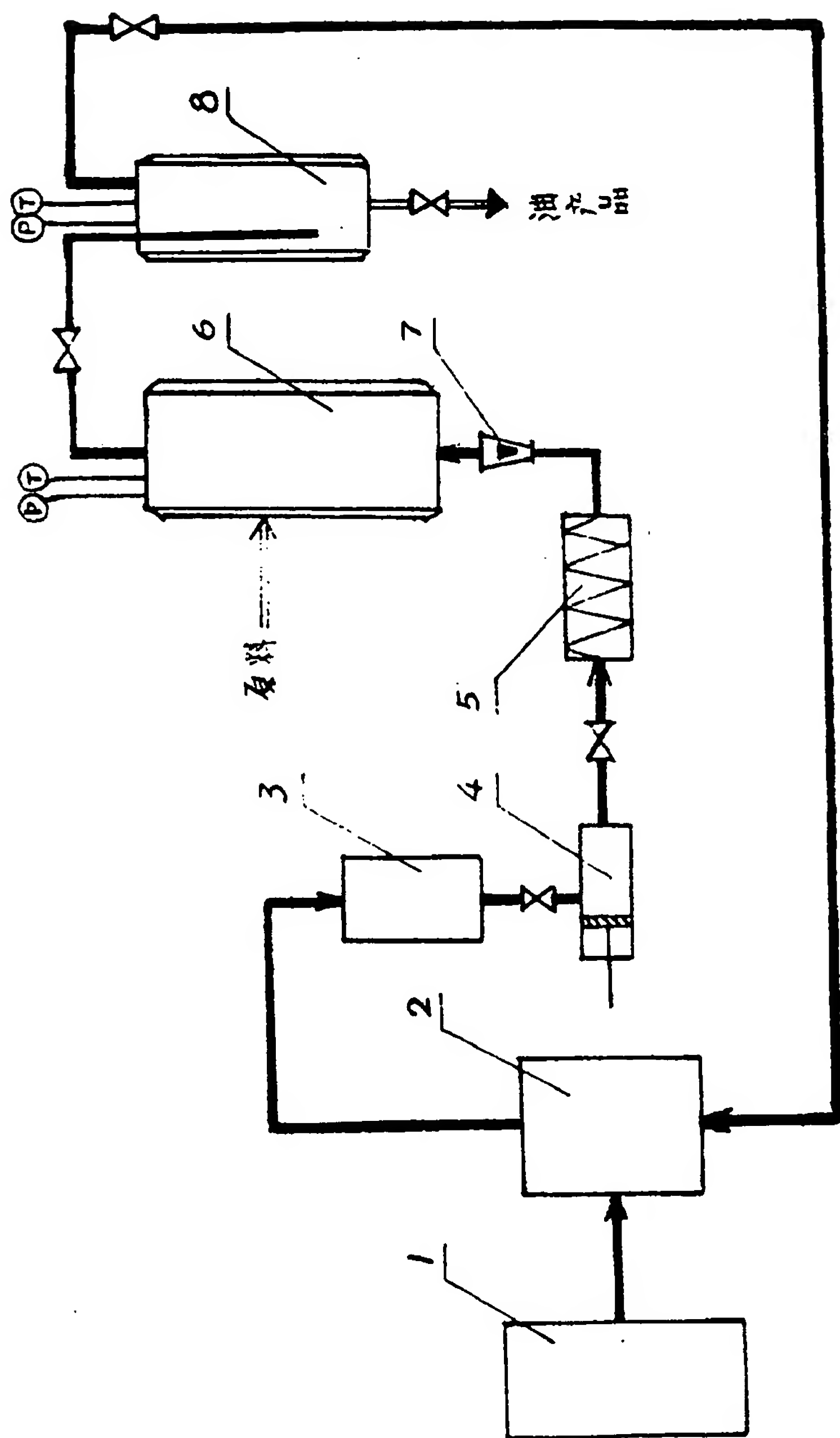


EXHIBIT 2



South China Botanical Garden Checklist

华南植物园 植物名录

zingiber corallinum    Search

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[SCBG Checklist](#) | [Family List](#) | [Zingiberaceae](#) ☼ | [Zingiber](#) ☼

**Zingiber corallinum** Hance

珊瑚姜

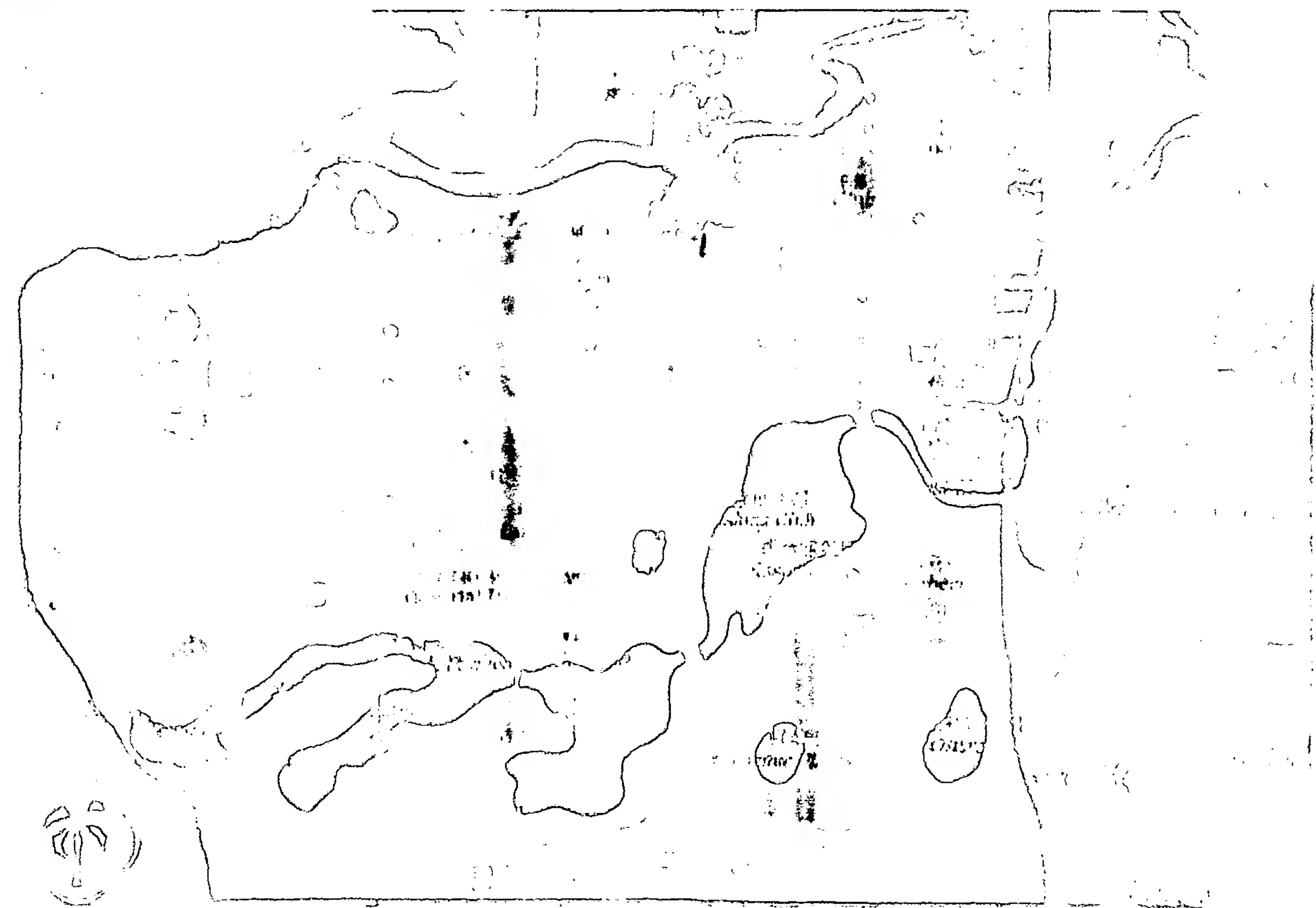
Description from Flora of China

Pseudostems ca. 1 m. Leaves sessile; leaf sheath sparsely hairy or glabrous; ligule 2–4 mm; leaf blade oblong-lanceolate or lanceolate, 20–30 × 4–6 cm, adaxially glabrous, abaxially sparsely hairy or glabrous. Inflorescences arising from rhizomes, oblong, 15–30 cm; peduncle 15–20 cm, scalelike sheaths 4–5 cm; bracts red, ovate, 3–4 cm, apex acute. Calyx 1.5–1.8 cm, split to middle. Corolla tube ca. 2.5 cm; lobes with purple stripe, oblong, ca. 1.5 cm, apex acute, central lobe larger than lateral ones. Central lobe of labellum obovate, ca. 1.5 cm; lateral lobes ca. 8 mm, apex acute. Anther sessile, ca. 1 cm; connective appendage beaklike, curved, ca. 5 mm. Ovary 2–2.5 mm, sericeous. Seeds black, glossy. Fl. May–Aug, fr. Aug–Oct. 2 *n* = 22\*.

Medicinal.

\* Dense forests. Guangdong, Guangxi, Hainan.

美国 Ginger Garden



Related Objects	
Flora of China	
• Illustration	Illustration

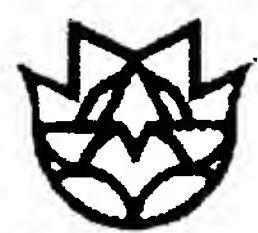
Related Links (opens in a new window)

Treatments in Other Floras @ [www.efloras.org](http://www.efloras.org)

- [Flora of China](#)
- [Chinese Plant Names](#)

Other Databases

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Flora of China

zingiber corallinum

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## Illustration

Taxon: Zingiber corallinum

ZINGIBERACEAE

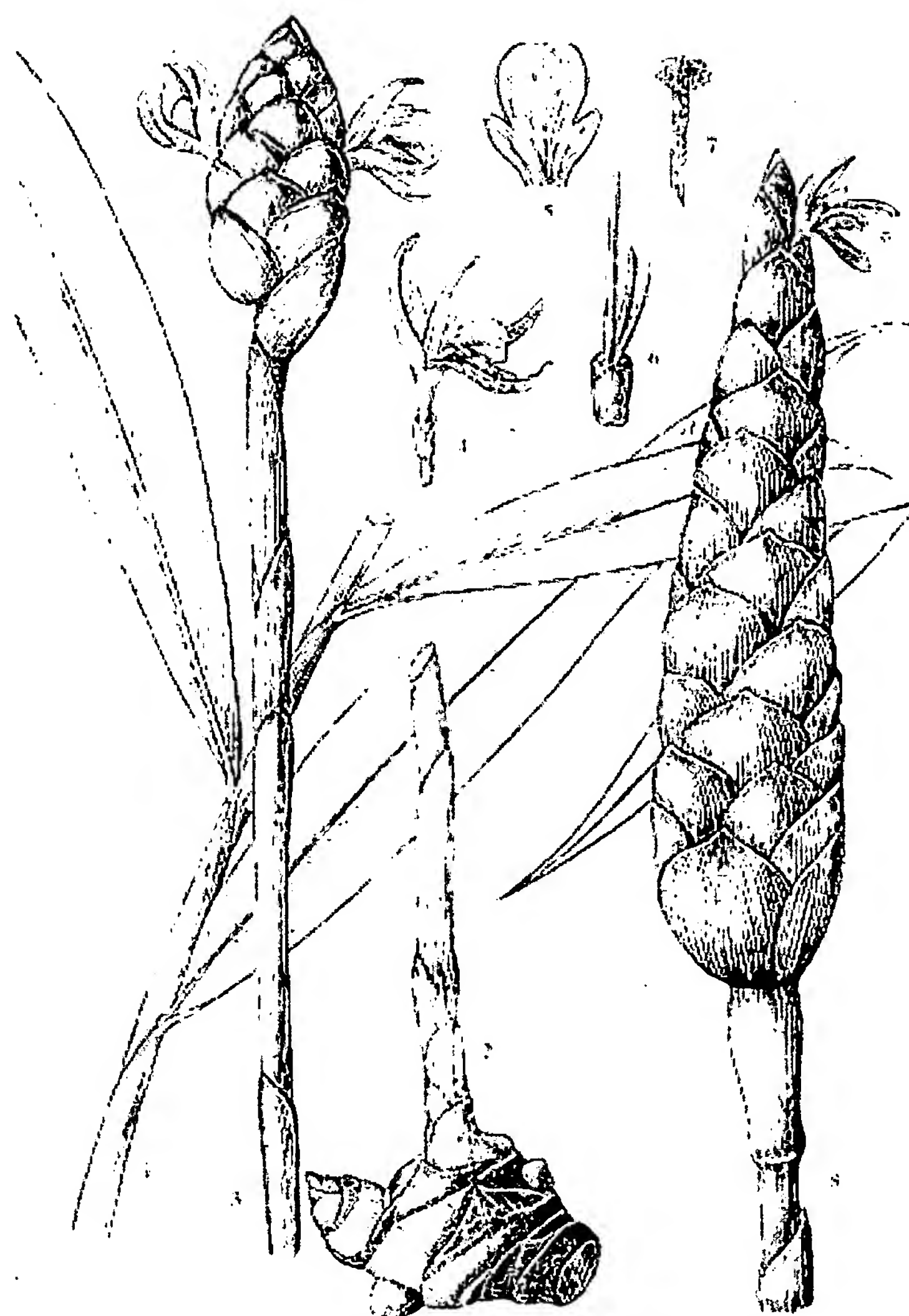


Figure 373. 1-8 Zingiber officinale Roscoe (姜). 1 Sterile branch. 2 Rhizome. 3 Distal portion of peduncle and inflorescence. 4 Flower. 5 Labellum. 6 Ovary and glands. 7 Style. 8 Z. corallinum Hance. 姜珊瑚 (shao hu jiang). 8 Inflorescence (FDC 325, 326, FRPS 10(2): 142, pl. 56, 981). 姜元 & 余汉平 (Jiang Zhongyuan & Yu Hanping, redrawn by 李改琴 (Li Gaiqin)).

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EXHIBIT 3

ZINGIBER

Ginger 2/11

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[larger image](#)

## Zingiber corallinum

\$24.99

### Zingiber corallinum

RARE!!! This ginger is from China and not seen for sale by very many c

**Hardiness Zone:** 8-11 **Height:** 2-3' **Light:** AM Filtered Light/Shade

**Please Choose:**

Type ☒ Plant

Enter C

ad  
to